Status of Ground-Based Arctic Cloud Validation Data Sets and Progress of Ground-Satellite Comparison Studies

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•Minnis, Berendes, Nguyen, Mack

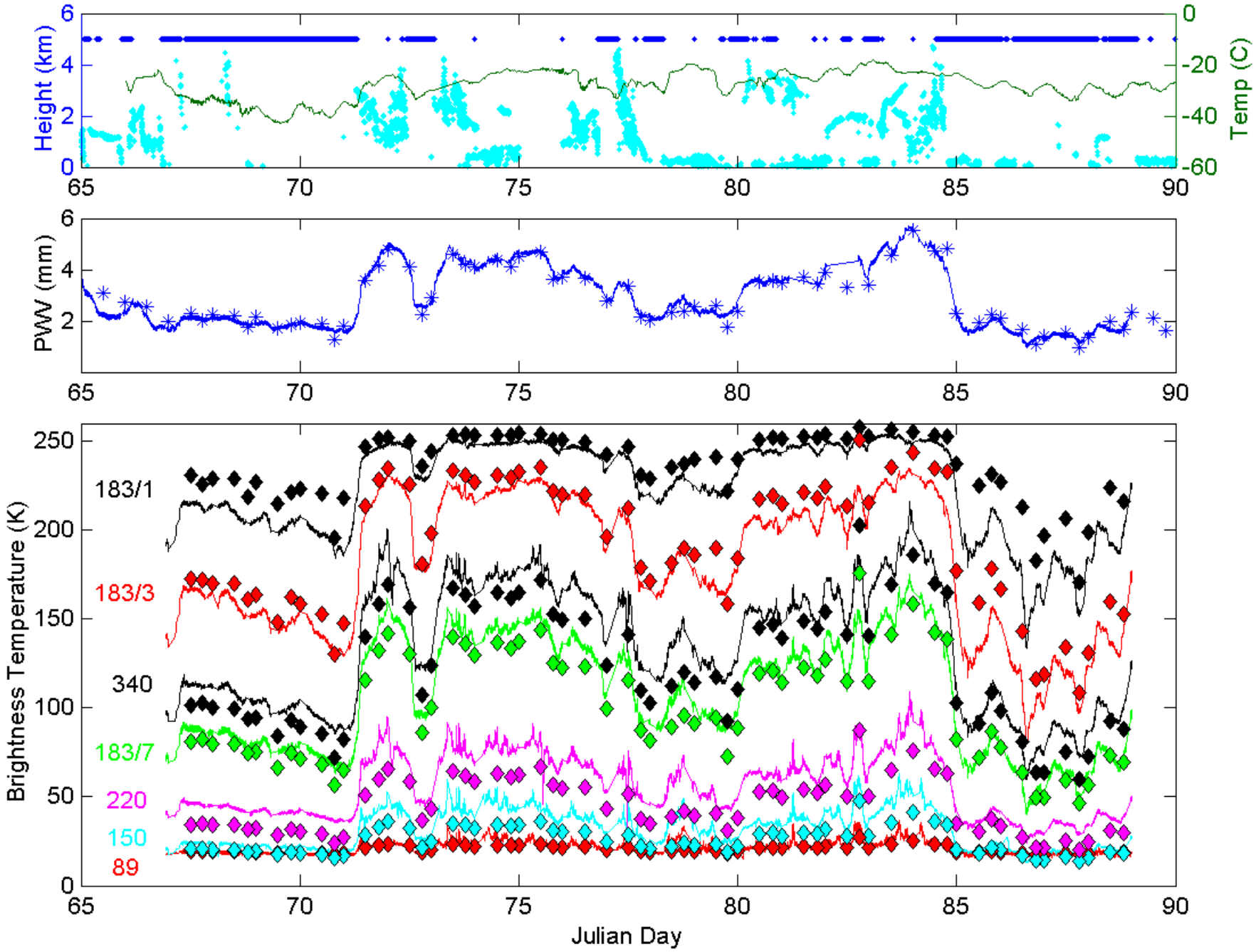
Instrument Status at NSA
Status of Retrieval Techniques
Status of NOAA/ETL Cloud Classifications
Status of Ground-Satellite Comparisons
Available Tools
Future?

Instrument Status at NSA

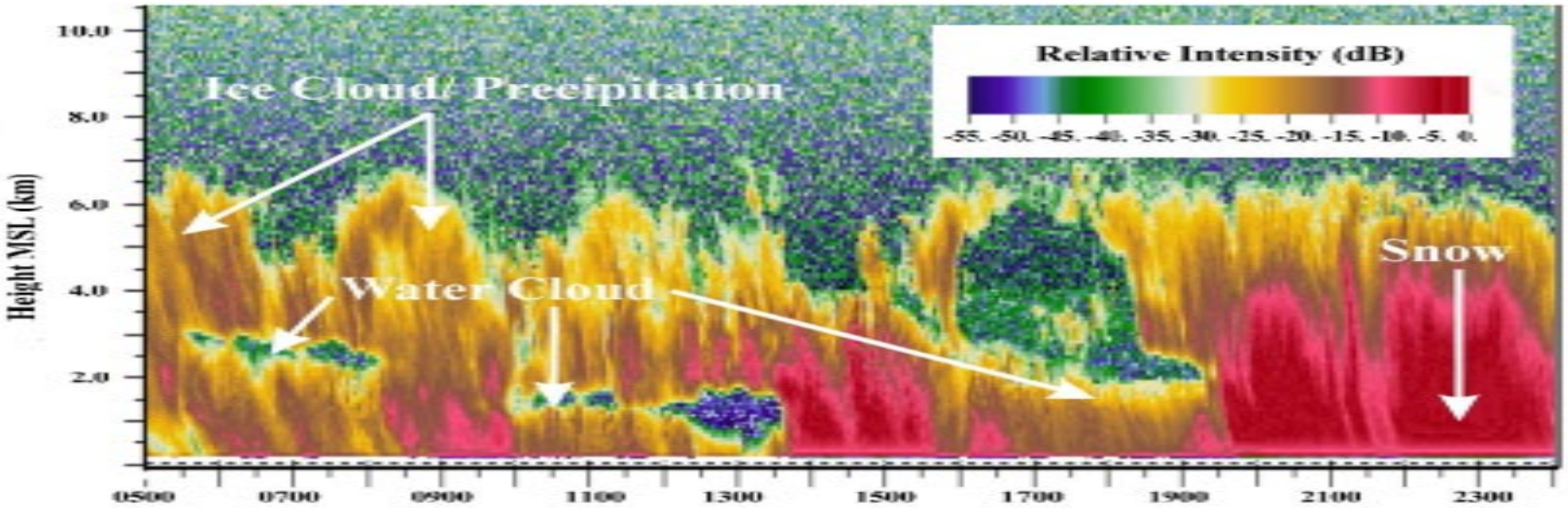
- MMCR data quality in April-July 2001
- MMCR data outages in April-Aug 2002
- Lack of 183 GHz radiometer
- Lack of a depolarization lidar

Days/month of missing MMCR data at NSA

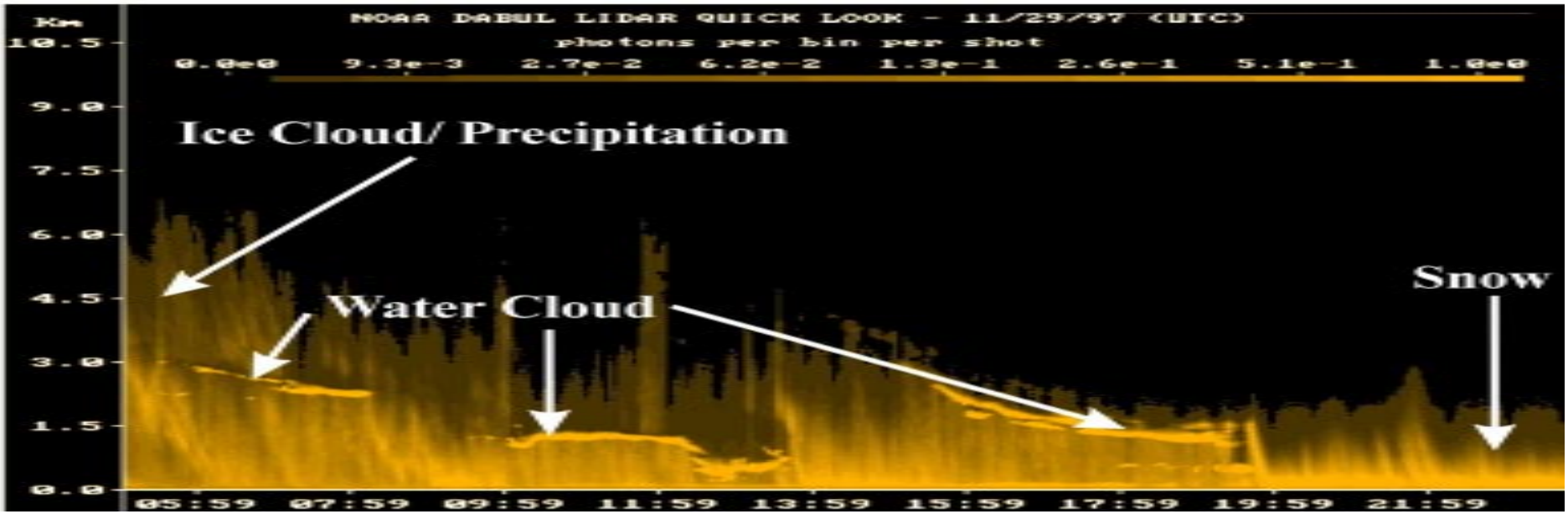
	2000	2001	2002
Jan	X	9	2
Feb	X	2	13
Mar	0	14	22
Apr	0	30	19
May	1	31	20
Jun	0	31	25
July	0	30	14
Aug	0	5	24
Sept	0	9	0
Oct	1	4	
Nov	0	12	
Dec	1	0	


Height (km)
Temp (C)
PWV (mm)
Brightness Temperature (K)
Julian Day
183/1
183/3
340
183/7
220
150
89

ETL mm-wavelength Cloud Radar

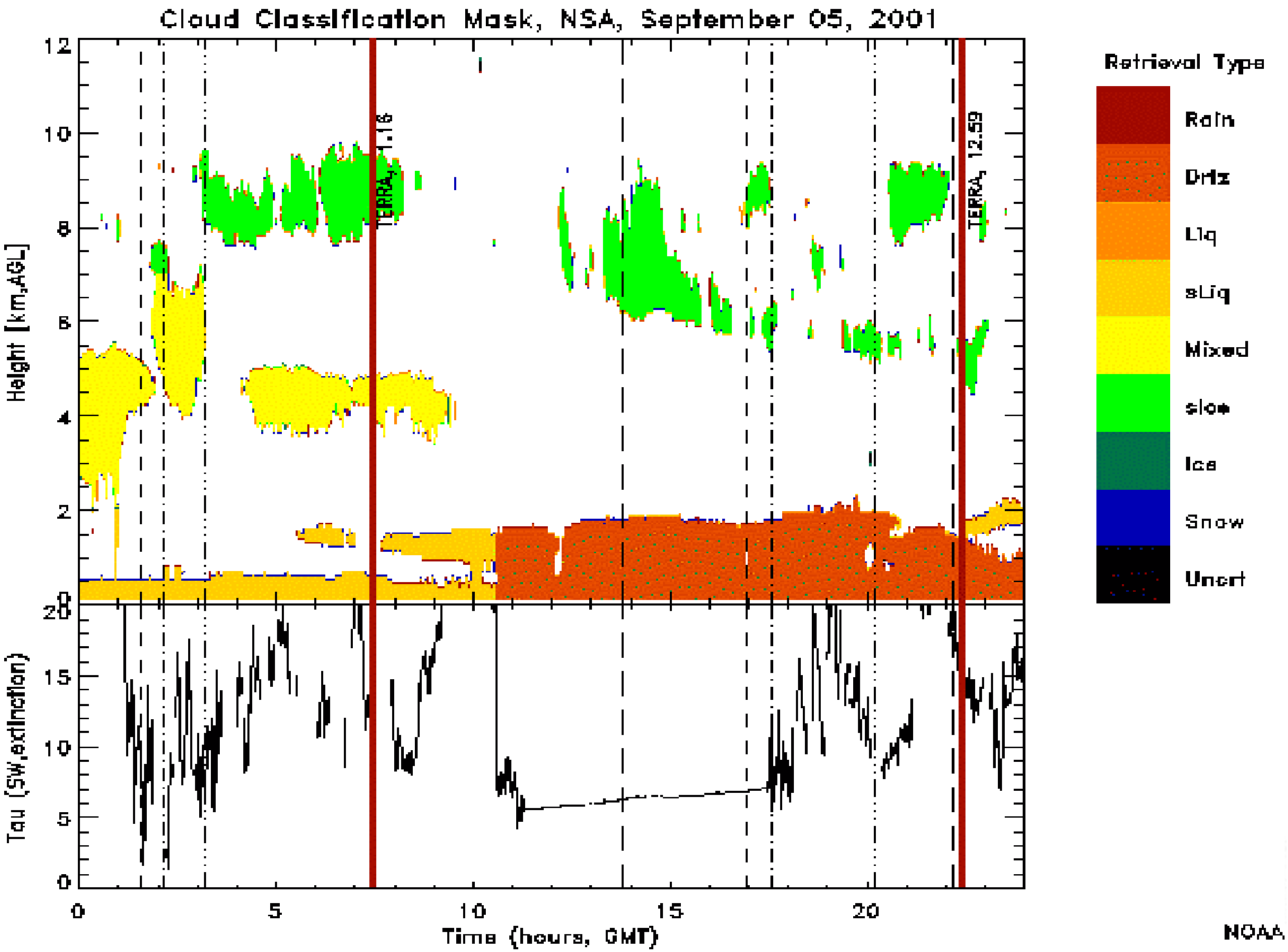


ETL Depolarization and Backscatter Lidar



Status of Retrieval Techniques

- Good progress on ice cloud retrievals
- Good progress on liquid cloud retrievals
- Some progress on mixed-phase retrievals
- COMPARISONS NEEDED between ground-based retrieval techniques!!!!

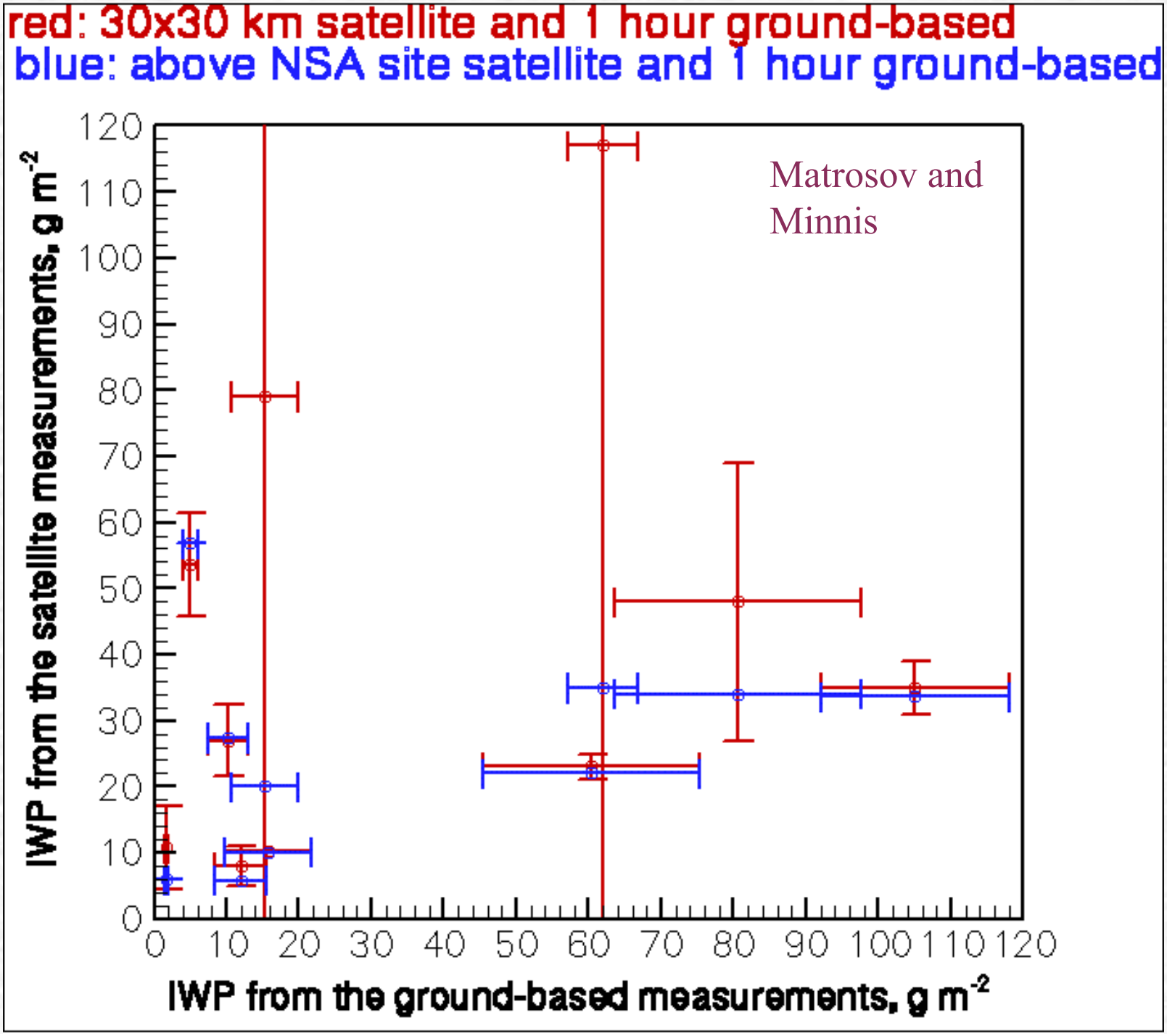

Cloud Classification Mask, NSA, September 05, 2001
Height [km,AGL]
Tau (SW,extinction)
Time (hours, GMT)
TERRA, 7.16
TERRA, 12.59
Retrieval Type
Rain
Drizz
Liq
sLiq
Mixed
slow
Ice
Snow
Uncrt
NOAA

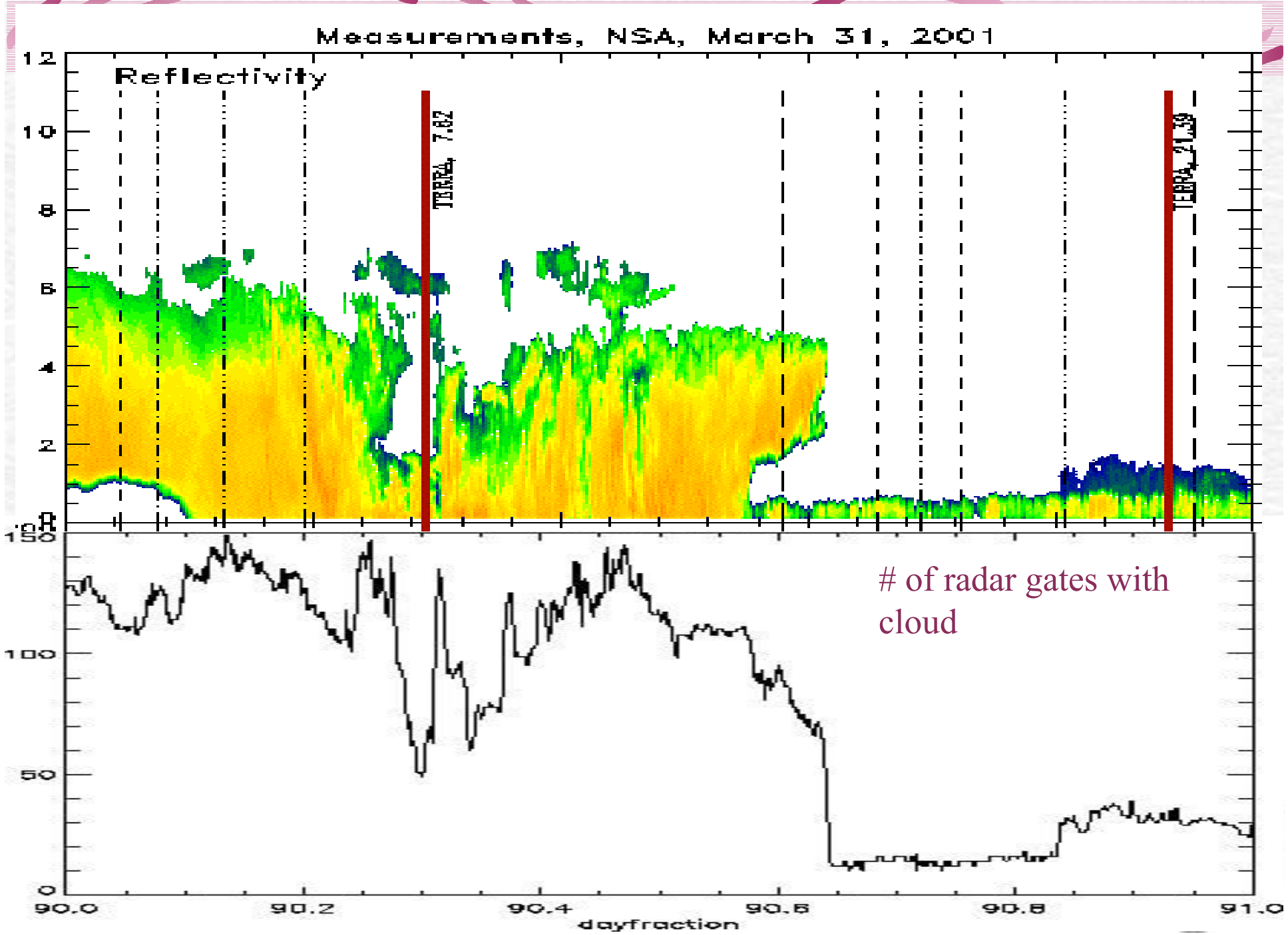
Status of NOAA/ETL Cloud Classifications for NSA

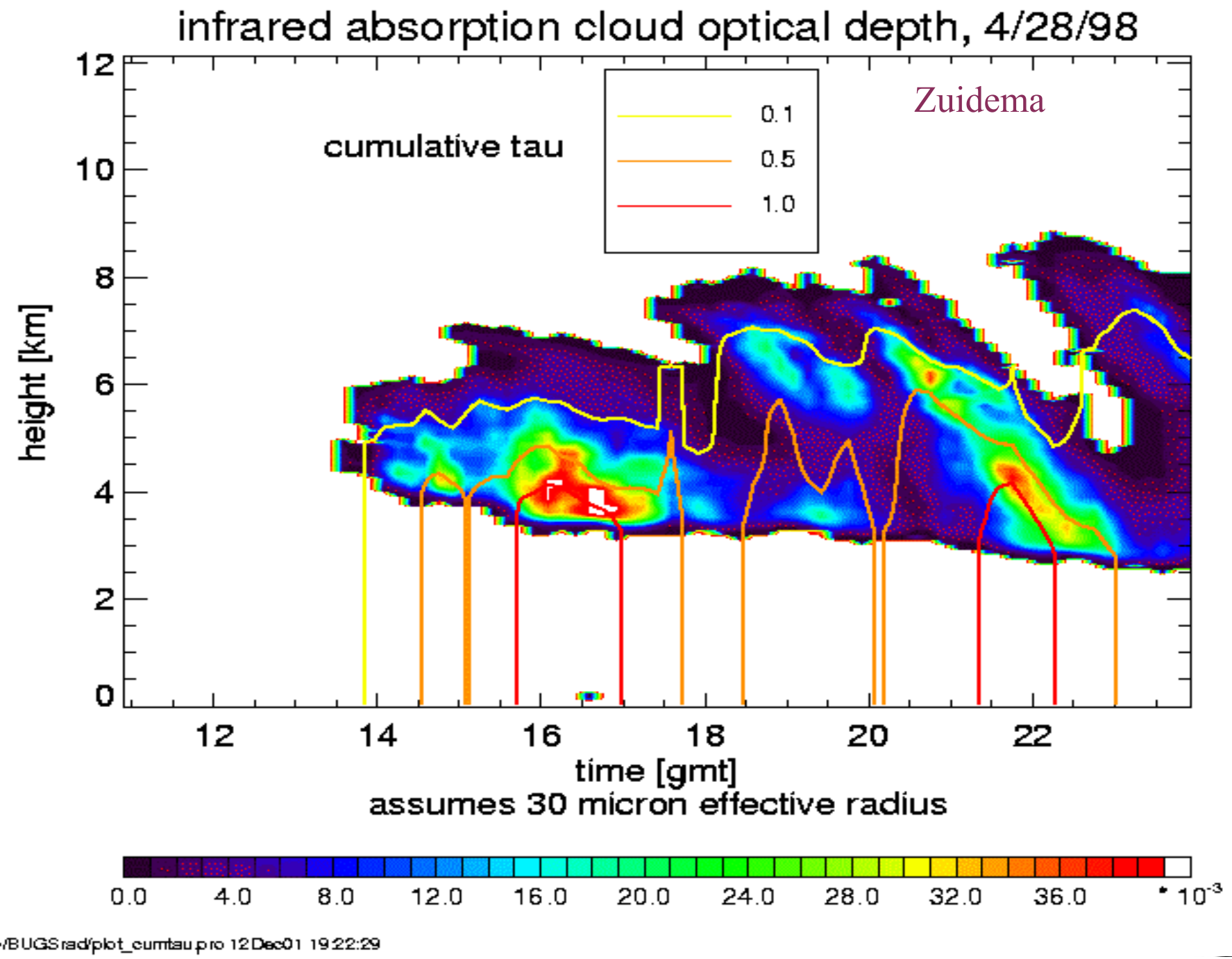
- Too subjective
- Will provide CD's to EOS by December 2002 with revised retrievals

Status of Comparisons

- Cloud presence
- Cloud height
- Cloud phase
- Cloud retrieval parameters
- Cloud optical depth weighted analyses
- Conditions necessary for successful satellite comparisons
- Statistical comparisons

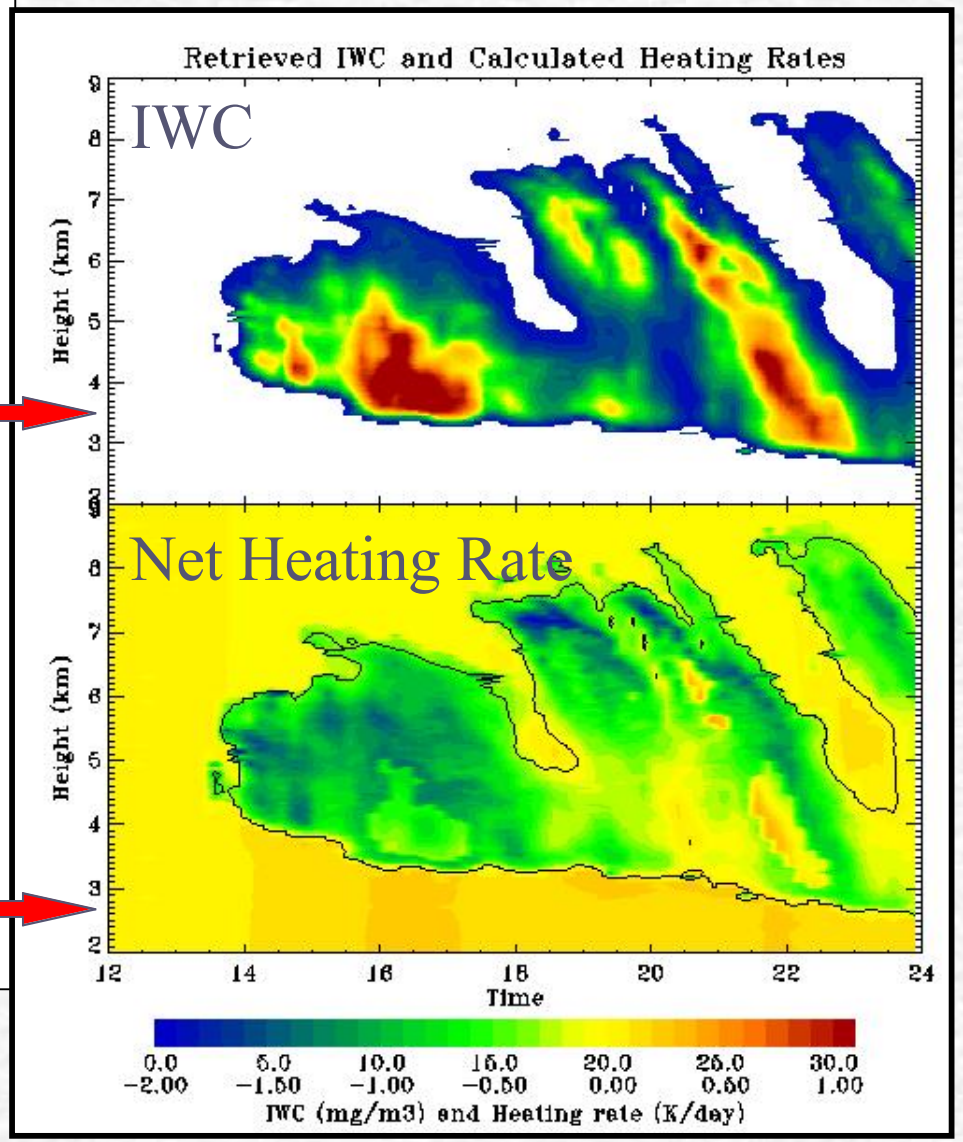

red: 30x30 km satellite and 1 hour ground-based
blue: above NSA site satellite and 1 hour ground-based
Matrosov and Minnis
IWP from the satellite measurements, g m-2
IWP from the ground-based measurements, g m-2
0
10
20
30
40
50
60
70
80
90
100
110
120

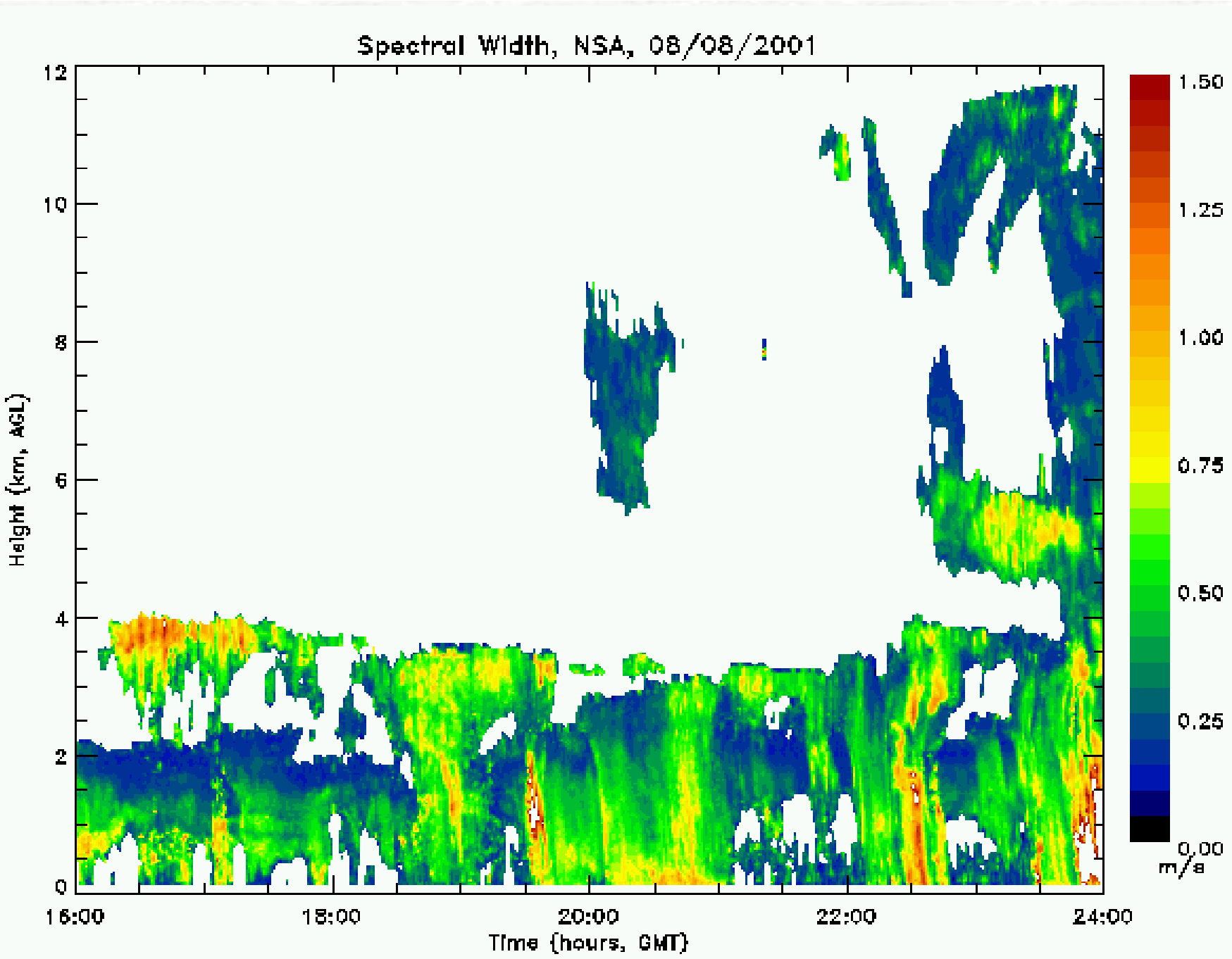

Measurements, NSA, March 31, 2001
Reflectivity
TERRA, 7.82
TERRA, 21.39
12
10
8
6
4
2
0
150
100
50
0
90.0
90.2
90.4
90.6
90.8
91.0
dayfraction
# of radar gates with cloud


infrared absorption cloud optical depth, 4/28/98
cumulative tau
0.1
0.5
1.0
Zuidema
height [km]
0
2
4
6
8
10
12
12
14
16
18
20
22
time [gmt]
assumes 30 micron effective radius
0.0
4.0
8.0
12.0
16.0
20.0
24.0
28.0
32.0
36.0
* 10^-3
~/BUGSrad/plot_cumtau.pro 12 Dec 01 19:22:29

- Measure:
  - vertical profiles of radar reflectivity; Doppler velocity; spectral width
  - downwelling T_B (IR & microwave)
- Retrieve:
  - effective radii
  - liquid/ice water contents
  - vapor and liquid paths
- Input to RT models:
  - heating rate (HR) profiles using CSU-BugsRad, streamer, etc

Zuidema




Spectral Width, NSA, 08/08/2001
Height (km, AGL)
0
2
4
6
8
10
12
16:00
18:00
20:00
22:00
24:00
Time (hours, GMT)
1.50
1.25
1.00
0.75
0.50
0.25
0.00
m/s

Goals for NOAA/ETL EOS project by Dec 2003

- CD/DVD and web access to NSA Cloud retrievals through December 2002
- Continue comparisons with satellite groups (Minnis et al, Berendes et al,)
- Possible statistical comparisons?
- Comparisons with other surface groups (Mace and Dong)
- Cloud forcing studies (determine which arctic cloud types are radiatively important)

Future

- NPOESS (VIRS operational algorithm team - VOAT)
- Ship-board data sets
- Extend utility of data set by doing TOVS, AVHRR, ISCCP etc comparisons
- Studies of Environmental Arctic Change (SEARCH)